



Editorial

Anniversaries and Issues

This issue begins *Environmental Health Perspective's* fourth year as a monthly publication. Over the years *EHP* has changed or added various components including the subject of our covers, elements of design, and new sections and formats. What remains consistent throughout the journal's evolution, however, is our commitment to communicating timely, accurate, and relevant information and to providing a forum for discussion of emerging and controversial environmental health issues.

The recent release of World Wildlife Fund toxicologist Theo Colborn's book, *Our Stolen Future*, continues a debate that began with Rachel Carson's *Silent Spring* over the impact of environmental chemicals on wildlife and humans. Carson's book, published in 1962, gave impetus to the burgeoning environmental movement in the United States and to the establishment of the U.S. Environmental Protection Agency. In *Silent Spring*, Carson provided evidence that exposure to pesticides and industrial chemicals was diminishing the reproductive capacity of wildlife and warned that unless these exposures were abated some species would become extinct. More than 30 years later, Colborn's book updates these findings with considerable toxicological evidence that environmental substances that mimic or block the actions of hormones are producing many of the widespread adverse effects on reproductive capacity and development in wildlife that Carson predicted. Colborn's own research in this area is a remarkable accomplishment. In addition, though, Colborn amplifies the warning of *Silent Spring* to include concerns over effects on human reproduction, development, and behavior.

The purpose of *Our Stolen Future* is presumably to raise public health awareness of endocrine-disrupting agents that humans encounter in day-to-day living and the possible relationship of these agents to human disease and dysfunction—an effort for which Colborn should be commended. Readers of the book should be mindful of this goal, however, and recognize that *Our Stolen Future* is neither a balanced nor an objective presentation of the scientific evidence on the issue of whether exposure to endocrine-disrupting environmental chemicals is causing significant increases in human disease. A more objective review of the available scientific data on the subject shows that there are large gaps between what we know of the effects of endocrine disruptors and what we don't know.

We know that there are numerous chemicals in the environment that mimic or alter hormone actions and that people are exposed to them. These include pesticides such as methoxychlor, DDT, and endosulfan and industrial chemicals and their by-products such as dioxin, PCBs, and alkylphenols. A number of natural products including plants and fungi that we eat contain estrogens—sometimes in biologically significant amounts. The biologic potency of these substances is often proportional to their affinity for hormone receptors and the length of time that they remain in the body.

There is considerable and convincing evidence in support of the contention that wildlife exposed to environmental estrogens exhibit reproductive and developmental deficits. These effects have

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been seen in birds, fish, amphibians, and mammals. Toxicity studies in experimental animals have demonstrated that hormonally active substances such as diethylstilbestrol, dioxins, and PCBs exert profound and deleterious changes in reproductive capacity, development, behavior, immune surveillance, and cancer incidence. These effects are consistent with information on mechanisms of action which show that some endocrine-disrupting agents interact with cellular receptors and that this interaction leads to changes in gene expression, cell proliferation, and differentiation characteristic of hormone action. Other endocrine-disrupting agents, such as the dioxins, alter the normal functioning of a number of hormone pathways including those for estrogens, glucocorticoids, cytokines, growth factors, and steroidogenesis. Together these biological data form a plausible basis for the claim that exposure to environmental hormones poses a human health risk.

Epidemiology studies also provide considerable data that some hormonally related diseases and dysfunctions are increasing. For example, breast cancer now strikes 1 in every 9 women (an increase from 1 in 20 in 1960), testicular cancer rates are rising, endometriosis rates may be rising, and sperm counts may be decreasing. Although trends in hormonally related diseases have not been clearly linked to environmental chemicals, it is probable that endocrine disrupters are, indeed, contributing to human diseases and dysfunction. The question then becomes how much they are contributing.

What is needed is high-quality basic and applied research to examine a number of critical areas including strategies for evaluating molecular determinants of hormone action in relation to dose-response relationships for endocrine disrupters; species comparisons of adverse effects including the capacity of changes in wildlife to predict human responses; identification of potential sensitive subpopulations based on age, gender, and genetic predisposition in order to conduct more definitive epidemiology studies; and more complete exposure data to determine the sources, amounts, and potencies of endocrine-disrupting chemicals that we are exposed to in our food, air, and water. One of the strengths of *Our Stolen Future* is that it provides a detailed list of research needs from those generated at the 1993 Wingspread Consensus Conference.

Realizing that we will never have the knowledge necessary to remove all uncertainty in human risk estimates, regulatory agencies must use science-based risk assessment as a key element in making decisions in the face of this uncertainty for the prevention of human disease. The broad array of chemicals considered as potential endocrine disruptors are no exception.

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